

CLAIMS

I claim:

1. A vibrating toothbrush comprising:

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an elongated hollow tube defining a toothbrush body having a top-head end and a bottom-seat end;

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a vibrating means disposed near said bottom-seat end inside said hollow tube wherein said vibrating means comprising a two-arm fork with a first fork and a second fork extended from a central portion wherein said first fork and second fork substantially extends semi-circularly opposite each other and having a first and second permanent magnets attached to an end of said first and second fork respectively;

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a vibrating lever arm mounted on said central portion of said vibrating means and extends therefrom toward said top-head end wherein said central portion rotating along a rotational axis defined by said vibrating lever arm; and

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a DC motor for rotating a vibrating driving shaft at a DC motor rotational frequency;

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said vibrating means further comprising a multiple-arm permanent magnet attached to and rotating with said vibrating driving shaft driven by said DC motor wherein said multiple-arm permanent magnet having a plurality of extended arms extended from said vibrating driving shaft toward and rotationally approaching said first and second permanent magnets for magnetically asserting a force on said two-arm fork for vibrating said two-arm fork and said vibrating lever arm attached thereto.

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2. The vibrating toothbrush of claim 1 further comprising:

5 a toothbrush head mounted onto said toothbrush body on said top-head end and mechanically coupled to and vibrating with said vibrating lever arm.

3. A vibrating toothbrush comprising:

10 an elongated hollow tube defining a toothbrush body having a top-head end and a bottom-seat end;

a vibrating means disposed near said bottom-seat end inside said hollow tube;

15 a vibrating lever arm mounted on said vibrating means and extends therefrom toward said top-head end; and

20 a rotational means for rotating a vibrating driving shaft at a rotational frequency and energy-transferably engaging said vibrating means for generating a vibrating frequency higher than said rotational frequency.

4. The vibrating toothbrush of claim 3 further comprising:

25 a toothbrush head mounted onto said toothbrush body on said top-head end and mechanically coupled to and vibrating at said vibrating frequency with said vibrating lever arm.

- 30 5. The vibrating toothbrush of claim 3 wherein:

said rotational means comprising a DC motor for rotating said vibrating driving shaft at a rotational frequency of said DC motor rotational speed.

6. The vibrating toothbrush of claim 3 wherein:

5 said vibrating means further comprising a two-arm fork with a first fork and a second fork extended from a central portion wherein said first fork and second fork substantially extends semi-circularly opposite each other and having a first and second permanent magnets attached to an end of said first and second fork respectively;

10 said central portion engaging said vibrating lever arm and rotating along a rotational axis defined by said vibrating lever arm; and

15 said vibrating means further comprising a multiple-arm permanent magnet attached to and rotating with said vibrating driving shaft driven by said rotation means wherein said multiple-arm permanent magnet having a plurality of extended arms extended from said vibrating driving shaft toward and rotationally approaching said first and second permanent magnets for magnetically asserting a
20 force on said two-arm fork for vibrating said two-arm fork and said vibrating lever arm attached thereto.

7. The vibrating toothbrush of claim 6 wherein:

25 said multiple-arm magnet comprising three extended arms extended from said vibrating driving shaft at positions represented by phase angles of substantially one-hundred-and-twenty degrees apart from each other for vibrating said
30 two-arm fork at substantially at a vibrating frequency three-times of a rotational frequency of said vibration driving shaft.

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- 5 8. A charging system for an automatic toothbrush comprising:
- 10 a primary electromagnetic transformer means disposed in a charging base for receiving an input AC current from an AC power source;
- a secondary electromagnetic transformer means disposed in a bottom end of said automatic toothbrush for immediately sitting on and electromagnetically coupling to said primary electromagnetic transformer means for generating an inductive secondary current as an AC input current for said charging system of said automatic toothbrush.
- 15 9. The charging system of claim 8 wherein:
- said primary electromagnetic-transformer means further includes a primary ferrite E-core;
- 20 said secondary electromagnetic-transformer means further includes a secondary ferrite E-core;
- 25 said primary ferrite E-core further include primary conductive coils wrapping around a center ferrite-E core for inputting an AC primary current; and
- 30 said secondary ferrite E-core further include secondary conductive coils wrapping around a center ferrite-E core for inducing a secondary inductive AC current.

10. The charging system of claim 8 further comprising:

a frequency converter disposed in said charging base for
converting an input AC current into an AC frequency of a
higher frequency for improving an efficiency of
electromagnetic transformation between said primary
electromagnetic-transformer means and said secondary
electromagnetic-transformer means.

11. The charging system of claim 8 further comprising:

a rectifier connected to said secondary conductive coil for
converting said secondary AC current into a DC charging
current for charging batteries of said automatic toothbrush.

12. The charging system of claim 8 wherein:

said rectifier generates a DC charging current greater than
160mA.

13. The charging system of claim 8 wherein:

said charging system is provided for charging said batteries
of said toothbrush at a rate greater than 1000mA per hour.

14. A charging system for an automatic toothbrush comprising:

a primary electromagnetic transformer means disposed in a
charging base for receiving an input AC current from an AC
power source;

a secondary electromagnetic transformer means disposed in
a bottom end of said automatic toothbrush for coupling
electro-magnetically to said primary electromagnetic
transformer means.